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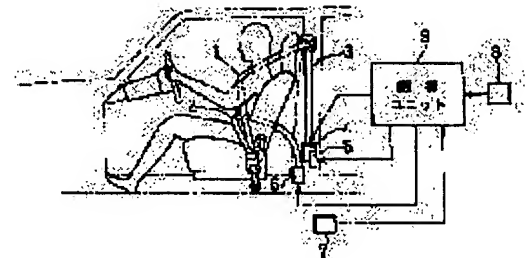
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(54) OCCUPANT PROTECTOR FOR VEHICLE

(57)Abstract:

PROBLEM TO BE SOLVED: To protect an occupant by appropriately holding the occupant by a seat belt when a vehicle is rolled over.

SOLUTION: An occupant protective device for vehicles to protect an occupant by a seat belt 3 provided with a shoulder belt to restrain a shoulder part of the occupant and a lap belt 2 to restrain a waist part of the occupant, is provided with a roll over detecting means to detect that the vehicle is rolled over according to the output signal, etc., of a gravity sensor 8, etc., and a pre-tensioner 6 to drive the lap belt 2 in the tightening direction when the roll over detecting means detects that the vehicle is rolled over, and the lap belt 2 is wound by the pre-tensioner 6 when the vehicle is rolled over.



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CLAIMS

[Claim(s)]

[Claim 1] Occupant crash protection for vehicles which takes care of crew with the seat belt equipped with the shoulder belt which restrains crew's shoulder characterized by providing the following, and the lap belt which restrains crew's waist A sideslip detection means to detect that vehicles sideslipped The pulley tensioner driven in the direction which tightens the above-mentioned lap belt when it is detected that it was prepared in the above-mentioned lap belt side, and vehicles sideslipped by the above-mentioned sideslip detection means

[Claim 2] Occupant crash protection for vehicles according to claim 1 characterized by having the 1st pulley tensioner driven in the direction which is established in a shoulder belt side at the time of the sideslip of vehicles, and tightens this shoulder belt, and the 2nd pulley tensioner driven in the direction which is established in a lap belt side and tightens this lap belt.

[Claim 3] Occupant crash protection for vehicles according to claim 2 characterized by constituting so that the tightening section of the 1st pulley tensioner which tightens a shoulder belt at the time of the sideslip of vehicles, and the tightening section of the 2nd pulley tensioner which tightens a lap belt may be driven by common driving means.

[Claim 4] In the occupant crash protection [equipped with the load limiting device constituted so that collision energy might be absorbed permitting that a seat belt is pulled out when the drawer force beyond a regulation value acts on a seat belt at the time of the collision of vehicles] for vehicles according to claim 1 to 3 Occupant crash protection for vehicles characterized by constituting so that the above-mentioned load limiting device may be made into a non-operating state when it is detected that vehicles sideslipped by the above-mentioned sideslip detection means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the occupant crash protection for vehicles which takes care of crew with the seat belt which has the shoulder belt which restrains crew's shoulder, and the lap belt which restrains crew's lumbar part.

[0002]

[Description of the Prior Art] While developing the front air bag which was equipped with the sensor which detects the collision of vehicles, and its direction, and the control means which operate a cure system based on the inspection result of this sensor at the time of two or more collisions, for example, was arranged ahead of crew at the time of the protrusion of vehicles so that it may be shown in the former, for example, JP,6-234342,A, centralized-control equipment is known at the time of the collision controlled to operate the pulley loader seat belt (pulley tensioner of a seat belt) holding crew's posture.

[0003] The absolute value of the acceleration detected by G sensor which detects the acceleration which acts on vehicles in two dimensions centralized-control equipment at the time of the above-mentioned collision When it is checked that it was judged with it being larger than a predetermined threshold, and the collision had occurred on vehicles By rolling round the seat belt which outputs the control signal which operates the above-mentioned pulley tensioner, and restrains crew's shoulder, i.e., a shoulder belt, and holding crew's posture with this shoulder belt, it is constituted so that an obstacle may be mitigated.

[0004]

[Problem(s) to be Solved by the Invention] As mentioned above, a pulley tensioner so that the posture of the crew who sat down on the sheet at the time of the collision of vehicles can be held effectively It is constituted so that the shoulder belt which restrains crew's shoulder may be rolled round. Since the lap belt which restrains crew's lumbar part cannot be positively tightened even if it operates a pulley tensioner, when accident on which vehicles sideslip occurs, There was a problem that it could not protect effectively, about a crevice being formed between crew's lumbar part and a lap belt, and crew's posture becoming unstable.

[0005] this invention offers the occupant crash protection for vehicles which can hold crew proper and can take care of him to crew with a seat belt at the time of the sideslip of vehicles in view of such a situation.

[0006]

[Means for Solving the Problem] Invention concerning a claim 1 has the pulley tensioner which drives in the direction which tightens the above-mentioned lap belt, when it is detected a sideslip detection means detect that vehicles sideslipped in the occupant crash protection for vehicles which takes care of crew with the seat belt equipped with the shoulder belt which restrains crew's shoulder, and the lap belt which restrains crew's lumbar part, and that it was prepared in the above-mentioned lap belt side, and vehicles sideslipped by the above-mentioned sideslip detection means.

[0007] According to the above-mentioned composition, by driving in the direction in which a pulley tensioner operates and a lap belt is tightened at the time of the sideslip of vehicles, it is prevented that a crevice is formed between this lap belt and crew's lumbar part, and crew's posture will be stabilized and will be held.

[0008] Invention concerning a claim 2 is equipped with the 1st pulley tensioner driven in the direction which is established in a shoulder belt side at the time of the sideslip of vehicles, and tightens this shoulder belt, and the 2nd pulley tensioner driven in the direction which is established in a lap belt side and tightens this lap belt in the occupant crash protection for vehicles of the claim 1 above-mentioned publication.

[0009] According to the above-mentioned composition, by driving in the direction in which the above 1st and the 2nd pulley tensioner operate, and a shoulder belt and a lap belt are tightened, respectively at the time of the sideslip of

vehicles, it is prevented that a crevice is formed between this shoulder belt and a lap belt, and crew's lumbar part and a shoulder, and crew's posture will be stabilized and will be held.

[0010] In the occupant crash protection for vehicles of the claim 2 above-mentioned publication, invention concerning a claim 3 is constituted so that the tightening section of the 1st pulley tensioner which tightens a shoulder belt at the time of the sideslip of vehicles, and the tightening section of the 2nd pulley tensioner which tightens a lap belt may be driven by common driving means.

[0011] According to the above-mentioned composition, it will be prevented by the tightening section of the above 1st and the 2nd pulley tensioner driving simultaneously by common driving means, and tightening a shoulder belt and a lap belt, respectively at the time of the sideslip of vehicles, that a crevice is formed with easy composition between the above-mentioned shoulder belt and a lap belt, and crew's lumbar part and a shoulder.

[0012] Invention concerning a claim 4 In the occupant crash protection [equipped with the load limiting device constituted so that collision energy might be absorbed permitting that a seat belt is pulled out when the drawer force beyond a regulation value acts on a seat belt at the time of the collision of vehicles] for vehicles according to claim 1 to 3 When it is detected that vehicles sideslipped by the above-mentioned sideslip detection means, it constitutes so that the above-mentioned load limiting device may be made into a non-operating state.

[0013] Crew will be effectively held by the seat belt by being forbidden that the above-mentioned load limiting device should be maintained by the non-operating state, and a seat belt should be pulled out for it being prevented that a crevice is formed between this lap belt and crew's lumbar part from this load limiting device by driving in the direction in which a pulley tensioner operates and a lap belt is tightened at the time of the sideslip of vehicles according to the above-mentioned composition.

[0014]

[Embodiments of the Invention] Drawing 1 shows the operation gestalt of the occupant crash protection for vehicles concerning this invention. The seat belt 3 which consists of a lap belt 2 which restrains the lumbar part of the shoulder belt 1 with which this occupant crash protection for vehicles restrains crew's shoulder, and crew, the [the load limiting device 4 formed in the end face section of the above-mentioned shoulder belt 1, and] -- with 1 pulley tensioner 5 The 2nd pulley tensioner 6 prepared in the end face section of the above-mentioned lap belt 2, The G sensor 7 which detects the degree of acceleration and deceleration which acts on vehicles, and the gravity sensor 8 which detects the operation direction of the gravity to vehicles and to detect, The state of vehicles is distinguished based on the detecting signal of each sensor, and it has the control unit 9 which outputs the control signal which operates the above-mentioned load limiting device 4 and the 1st, and 2 pulley tensioners 5 and 6 according to this distinction result.

[0015] The specification-part material 10 around which the shoulder belt 1 was twisted as the above-mentioned load limiting device 4 was shown in drawing 2 , The 1st clamp 11 and 12 of the couple installed by carrying out phase opposite so that a shoulder belt 1 might be pinched, The locking lever 13 which pushes one 1st clamp 11 to the 1st clamp 12 side of another side, the actuator 14 to which the rocking variation rate of this locking lever 13 is carried out, and rocking of the above-mentioned locking lever 13 -- with the stopper 15 which regulates a variation rate It has the 2nd clamp 16 and 17 of the couple arranged by carrying out phase opposite under the 1st clamp 11 and 12 of the above, and the paper winding shaft 18 which carries out the rotation drive of the above-mentioned specification-part material 10, and rolls round a shoulder belt 1.

[0016] And at the time of the collision of vehicles, when an actuator 14 operates and a locking lever 13 carries out rocking displacement from a downward position in readiness in an upper push position according to the control signal outputted from the above-mentioned control unit 9, as shown in drawing 3 , above-mentioned one 1st clamp 11 is pushed at the 1st clamp 12 side of another side, and a shoulder belt 1 is pinched by both this 1st clamp 11 and 12. Moreover, if the shoulder belt 1 was pulled out from the above-mentioned load limiting device 4 by the inertia force which acts on crew at the time of the collision of vehicles, when the 1st clamp 11 and 12 of the above will go up along with casing of a load limiting device 4 in connection with this and the above-mentioned stopper 15 will be contacted, elevation of the 1st clamp 11 and 12 of the above will be regulated.

[0017] rocking of the above-mentioned locking lever 13 which engaged with one 1st clamp 11 according to elevation of both the 1st clamp 11 and 12 being regulated with the above-mentioned stopper 15 -- a variation rate is prevented and the fixed pinching force is given to a shoulder belt 1 in connection with this by both the 1st clamp 11 and 12 of the above If the drawer force beyond the pinching force by both the 1st clamp 11 and 12 of the above acts, therefore, by compressing the above-mentioned specification-part material 10, and deforming plastically A shoulder belt 1 is pulled out only for the amount corresponding to path change of this specification-part material 10 from a load limiting device 4. In this case, when the frictional resistance according to the pinching force of both the 1st clamp 11 and 12 of the above acts, while collision energy is absorbed, collision energy is absorbed when the above-mentioned specification-part material 10 deforms plastically.

[0018] Moreover, when a load limiting device 4 needs to be maintained to a non-operating state, the 2nd clamp 16 and 17 arranged under the 1st clamp 11 and 12 of the above is driven with the actuator outside drawing which operates according to the control signal outputted from a control unit 9 at the time of the sideslip of vehicles, and it is constituted by pinching the above-mentioned shoulder belt 1 so that it may forbid that this shoulder belt 1 should be pulled out from a load limiting device 4.

[0019] The above-mentioned 1st pulley tensioner 5 has the pinion gear 19 supported by casing free [rotation], the rack gear 20 which carries out the rotation drive of this pinion gear 19, and the gas generator 21 which drives this rack gear 20, as it is constituted so that the shoulder belt 1 which holds crew's shoulder at the time of the collision of vehicles etc. may be rolled round, for example, shown in drawing 4 . And by carrying out the rotation drive of the above-mentioned pinion gear 19 by the driving means which consist of the above-mentioned rack gear 20 and a gas generator 21, it is constituted so that the above-mentioned shoulder belt 1 may be tightened.

[0020] Namely, a gas generator 21 operates according to the control signal outputted from the above-mentioned control unit 9 at the time of the collision of vehicles etc. When the gas pressure moved to an upper activation point from a downward position in readiness as shown in an arrow generates the above-mentioned rack gear 20, while the rotation drive of the above-mentioned pinion gear 19 is carried out The rotation drive of the paper winding shaft 18 of the above-mentioned load limiting device 4 connected with this pinion gear 19 is carried out, the above-mentioned shoulder belt 1 is rolled round, and it is tightened.

[0021] The above-mentioned rack gear 20 is constituted so that it may engage with the stopper 22 which consists of flat spring material arranged above the pinion gear 19 and may be stopped by the above-mentioned activation point after the operation of a gas generator 21, as shown in drawing 5 . It will be prevented that the pinion gear 19 rotates in the direction which slack produces in the shoulder belt 1 once tightened by this.

[0022] Moreover, as the above-mentioned 2nd pulley tensioner 6 is constituted so that the lap belt 2 which holds crew's lumbar part at the time of the sideslip of vehicles etc. may be rolled round, for example, shown in drawing 6 - drawing 8 The paper winding shaft 25 supported free [rotation] [above the fixed part 23 of the lap belt 2], the rack gear 27 which engages with the pinion gear section 26 formed in the unilateral edge of this paper winding shaft 25, and carries out the rotation drive of the above-mentioned paper winding shaft 25, and the gas generator 28 which drives this rack gear 27 -- having -- the above-mentioned paper winding shaft 25 -- insertion of the lap belt 2 -- the hole 24 is formed

[0023] And by a gas generator's 28 operating according to the control signal outputted to the 2nd pulley tensioner 6 from the above-mentioned control unit 9, and the gas pressure which moves the above-mentioned rack gear 27 to a downward activation point from an upper position in readiness as shown in the arrow of drawing 7 occurring, and carrying out the rotation drive of the above-mentioned paper winding shaft 25 at the time of the sideslip of vehicles etc., on this paper winding shaft 25, the lap belt 2 is rolled round and it is tightened. The pinion gear section 26 of the above-mentioned paper winding shaft 25 is stopped by the stopper 29 which consists of flat spring material arranged in the side of the rack gear 27 as shown in drawing 9 . It is prevented that the above-mentioned paper winding shaft 25 rotates in the direction which slack produces by this to the lap belt 2 once tightened after the operation of a gas generator 28.

[0024] The above-mentioned G sensor 7 is constituted so that the deceleration which acts on the cross direction of the body may be detected and this detecting signal may be outputted to the above-mentioned control unit 9. As shown in drawing 10 , according to the detecting signal outputted from the above-mentioned G sensor 7, a collision state detection means 29 to detect whether vehicles changed into the collision state, and a sideslip detection means 30 to detect whether vehicles changed into the sideslip state according to the detecting signal of the above-mentioned gravity sensor 8 are formed in this control unit 9.

[0025] While the above-mentioned collision state detection means 29 detects whether vehicles changed into the collision state based on the degree of acceleration and deceleration detected by the G sensor 7 At the time of the collision of vehicles, the threshold used as the criterion of whether to operate the above 1st and the 2nd pulley tensioners 5 and 6 and its operation stage are set up. And it is constituted so that the traverse speed and the travel of a head of crew between the predetermined stage before a collision and the time of a collision may be found according to an operation. And when it is checked that the traverse speed and the travel of a head of the crew who asked in the above-mentioned collision state detection means 29 are larger than the above-mentioned threshold, the control signal which operates the above-mentioned 1st pulley tensioner 5 and a load limiting device 4 to predetermined timing, respectively is outputted.

[0026] Moreover, the above-mentioned sideslip detection means 30 is constituted so that the above-mentioned load limiting device 4 may be made into a non-operating state while outputting the above 1st, the 2nd pulley tensioner 5, and the control signal that operates 6 TOBERUTO 1, when it is checked that vehicles have changed into a sideslip state according to the detecting signal of the gravity sensor 8. That is, when the control signal which makes a conclusion state the 2nd clamp 16 and 17 of a load limiting device 4 from the above-mentioned sideslip detection means 30 is outputted and a shoulder belt 1 is pinched by both this 2nd clamp 16 and 17, it is forbidden that a shoulder belt 1 should be pulled

out from the above-mentioned load limiting device 4.

[0027] It explains based on the flow chart which shows the control action performed in the above-mentioned control unit 9 to drawing 11. If this control action starts, after inputting the detection value of each above-mentioned sensor (Step S1), it will judge whether according to the detecting signal of the above-mentioned gravity sensor 8, vehicles changed into the sideslip state (Step S2). When judged with YES at this step S2, after operating the above 1st and the 2nd pulley tensioners 5 and 6 (Step S3, S4), the control signal which makes the above-mentioned load limiting device 4 a non-operating state is outputted (Step S5).

[0028] moreover, when it is checked that it is judged with NO at the above-mentioned step S2, and vehicles will be in a sideslip state It judges whether it became more than a collision decision value about [to which the deceleration G detected by the above-mentioned G sensor 7 was set beforehand] $3g$ (g is gravitational acceleration), and the collision occurred (Step S6). When judged with NO, it judges that it is not necessary to perform operation control of the above-mentioned load limiting device 4 and the 1st, and the 2nd pulley tensioners 5 and 6, and a return is carried out.

[0029] Moreover, it is judged with YES at the above-mentioned step S6; and when it is checked that the deceleration G $3g$ or more had acted on the body, i.e., the collision of vehicles occurred, based on the detection value of each above-mentioned sensor etc., the thresholds $V1$ and $L1$ used as the criterion of whether to operate the above-mentioned 1st pulley tensioner 5 and the operation timing $T1$ of the 1st pulley tensioner 5 are set up (Step S7). For example, based on the data of the map beforehand memorized by the storage means, and the detection value of each above-mentioned sensor, the threshold $V1$ corresponding to traverse speed and the threshold $L1$ corresponding to this travel, and the above-mentioned operation timing $T1$ of a head of crew are read and set up.

[0030] Subsequently, based on the detection value of the above-mentioned deceleration G , the traverse speed V of crew's head and this travel L are calculated (Step S8). Namely, when only a predetermined time α integrates with the value of the above-mentioned deceleration G in within a time [from before (for example, 1 second before) to this time] rather than this time by which it was checked that vehicles had changed into the collision state, while asking for traverse-speed [of the above-mentioned head] $V \{=\int Gdt\}$ ($t=-\alpha-0$) It asks for travel [of the above-mentioned head] $L \{=\int Vdt\}$ ($t=-\alpha-0$) by integrating with the value of the above-mentioned traverse speed V in a within a time one.

[0031] Then, since the inertia force which acts on crew is small when the traverse speed V of the above-mentioned head and the operation value of Travel L judge, respectively whether it is the above-mentioned threshold $V1$ set up at Step S7, and more than $L1$ (step S9, S10) and are judged by both this step S9 and either of S10 in it to be NO, it judges that it is not necessary to perform operation control of the above-mentioned 1st pulley tensioner 5, and a return is carried out.

[0032] moreover, when it is judged with YES by the above-mentioned step S9 and S10, respectively After rolling round in the direction which the above-mentioned 1st pulley tensioner 5 is operated based on the operation timing $T1$ set up at the above-mentioned step S3, and tightens a shoulder belt 1 (Step S11), While operating the actuator 14 of the above-mentioned load limiting device 4 and regulating the drawer of the above-mentioned shoulder belt 1 (Step S12), the control signal which develops the air bag outside drawing arranged ahead of the crew who sat down on the sheet is outputted (Step S13).

[0033] Thus, it sets to the occupant crash protection for vehicles which takes care of crew with the seat belt 3 equipped with the shoulder belt 1 which restrains crew's shoulder, and the lap belt 2 which restrains crew's lumbar part. While establishing a sideslip detection means 30 to detect that vehicles sideslipped Since it constituted so that it might drive in the direction which the pulley tensioner 6 is formed in the above-mentioned lap belt 2 side, the above-mentioned pulley tensioner 6 is operated when it is detected that vehicles sideslipped by the above-mentioned sideslip detection means 30, and tightens the lap belt 2, at the time of the sideslip of vehicles Within the vehicles which prevented and sideslipped that a gap was formed between the above-mentioned lap belt 2 and crew's lumbar part, with the above-mentioned lap belt 2, crew is stabilized and crew's body can be held.

[0034] Moreover, while forming the 1st pulley tensioner 5 driven with the above-mentioned operation gestalt in the direction which tightens a shoulder belt 1 in a shoulder belt 1 side Since the 2nd pulley tensioner 6 driven in the direction which tightens the lap belt 2 was formed in the lap belt 2 side, At the time of the sideslip of vehicles, by operating the 1st and the 2nd pulley tensioners 5 and 6, respectively, the above-mentioned shoulder belt 1 and the lap belt 2 are tightened, both crew's shoulder and the lumbar part are restrained, within the vehicles which sideslipped, it is stabilized more and crew's body can be held.

[0035] Especially with the seat belt 3 of a **** integral with which it comes to connect the above-mentioned shoulder belt 1 and the lap belt 2 with one Since the slack of a shoulder belt 1 may shift to the lap belt 2, By constituting as mentioned above, so that both the 1st and the 2nd pulley tensioners 5 and 6 may be operated at the time of the sideslip of vehicles It is desirable to prevent preventing that the slack of the above-mentioned shoulder belt 1 affects the lap belt 2, and forming a gap between the lap belt 2 and crew's lumbar part.

[0036] Moreover, it sets to the occupant crash protection for vehicles equipped with the load limiting device 4 which absorbs the collision energy which acts on a shoulder belt 1 with the above-mentioned operation gestalt. Since it constituted so that the above-mentioned load limiting device 4 might be made into a non-operating state when it was detected that vehicles sideslipped by the above-mentioned sideslip detection means 30, After driving in the direction which the above 1st and the 2nd pulley tensioners 5 and 6 are operated, and tightens a seat belt 3, it can prevent certainly that a seat belt 3 is pulled out from the above-mentioned load limiting device 4. Therefore, generating of the situation where originate in a seat belt 3 being pulled out from the above-mentioned load limiting device 4 at the time of the sideslip of vehicles, and crew's maintenance condition becomes unstable can be prevented effectively.

[0037] And in case the drawer force more than constant value acts and a shoulder belt 1 is pulled out, holding crew's posture proper with this shoulder belt 1 by regulating that operate the above-mentioned load limiting device 4, and a shoulder belt 1 is pulled out when the protrusion accident on which vehicles do not sideslip occurs, it can prevent effectively that absorb striking energy with the above-mentioned load limiting device 4, and an excessive load acts on crew. In addition, in the occupant crash protection for vehicles by which the above-mentioned load limiting device 4 and the 1st pulley tensioner 5 were formed in the end face section of a shoulder belt 1 etc., without operating the above-mentioned 1st pulley tensioner 5 at the time of the sideslip of vehicles, you may constitute so that the drawer of a shoulder belt 1 may be forbidden by making a load limiting device 4 into a non-operating state.

[0038] In addition, although the example constituted so that only the 1st pulley tensioner 5 might be operated and a shoulder belt 1 might be tightened was explained when it was checked that the collision of vehicles had occurred by the collision state detection means 29, you may constitute from an above-mentioned operation gestalt so that both the 1st and the 2nd pulley tensioners 5 and 6 may be operated at the time of the collision of vehicles. In this case, by driving in the direction which tightens both the above-mentioned shoulder belt 1 and the lap belt 2, it can prevent that the slack of the lap belt 2 influences a shoulder belt 1, and crew can be taken care of still more effectively with this shoulder belt 1.

[0039] When adopting the above-mentioned composition, you may constitute so that the tightening section of the 1st pulley tensioner 5 which tightens a shoulder belt 1, and the tightening section of the 2nd pulley tensioner 5 which tightens the lap belt 2 may be driven by common driving means. For example, as shown in drawing 12, it is good also as structure which formed the common driving means 34 which consist of a rack gear 32 which consists of a pinion gear 19 of the 1st pulley tensioner 5, which tightens and serves as the section from the paper winding shaft 25 of the 2nd pulley tensioner 6, and which carries out the rotation drive of both the tightening section, respectively while tightening and arranging the section up and down, and a gas generator 33 which moves this rack gear 32 to an upper activation point from a downward position in readiness.

[0040] When constituted as mentioned above, at the time of the sideslip of vehicles, and a collision, by driving the above 1st and the 2nd pulley tensioners 5 and 6 to abbreviation ****, both the above-mentioned shoulder belt 1 and the lap belt 2 can be tightened with easy composition, and crew can be held effectively. Moreover, while making the point of the rack gear 32 which is in the above-mentioned position in readiness like the example of drawing engage with the paper winding shaft 25 of the 2nd pulley tensioner 6 located caudad According to the composition which arranged the above-mentioned rack gear 32 so that it might be made to estrange from the pinion gear 19 of the 1st pulley tensioner 5 located up Usually, at the time of the operation of the above-mentioned driving means 34, there is an advantage that the rotation drive of the paper winding shaft 25 of the 2nd pulley tensioner 6 can be carried out quickly, sometimes supporting possible [rotation of the paper winding shaft 18 of the load limiting device 4 connected with the pinion gear 19 of the above-mentioned 1st pulley tensioner 5].

[0041]

[Effect of the Invention] In the occupant crash protection for vehicles from which this invention protects crew with the seat belt equipped with the shoulder belt which restrains crew's shoulder, and the lap belt which restrains crew's lumbar part as explained above Since the pulley tensioner driven in the direction which tightens the above-mentioned lap belt was prepared when it was detected a sideslip detection means to detect that vehicles sideslipped, and that it was prepared in the above-mentioned lap belt side, and vehicles sideslipped by the above-mentioned sideslip detection means, at the time of the sideslip of vehicles By driving in the direction which the above-mentioned pulley tensioner is operated and tightens a lap belt It can prevent that a gap is formed between the above-mentioned lap belt and crew's lumbar part, and there is an advantage that crew is stabilized and crew's body can be held with the above-mentioned lap belt within the vehicles which sideslipped.

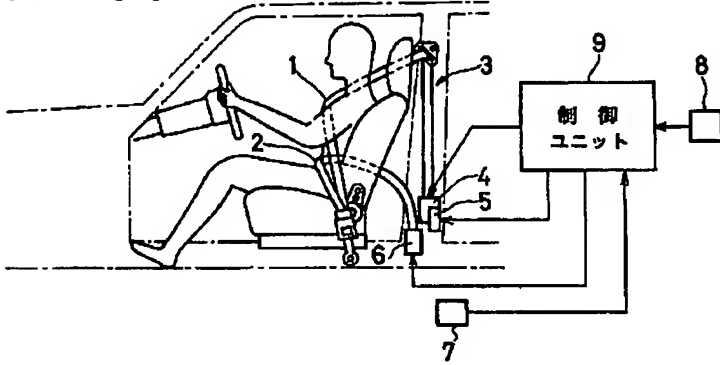
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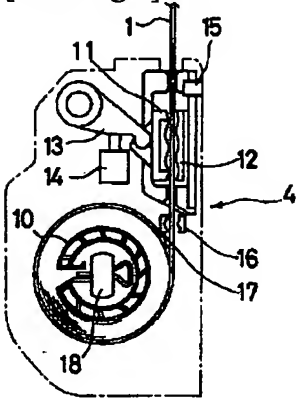
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DRAWINGS

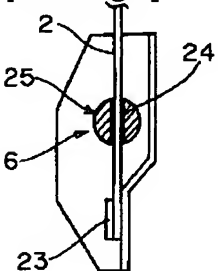
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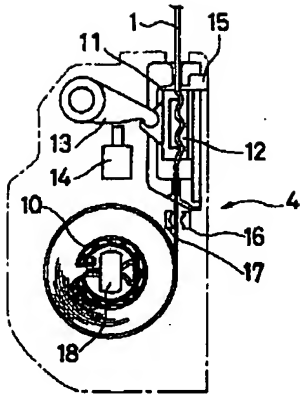
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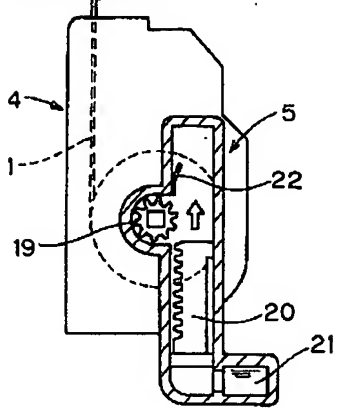
[Drawing 8]



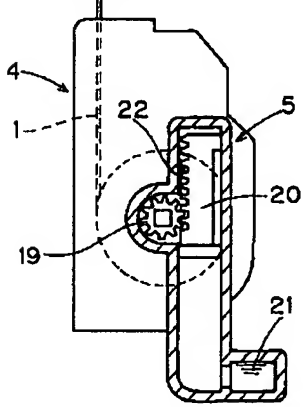
[Drawing 3]



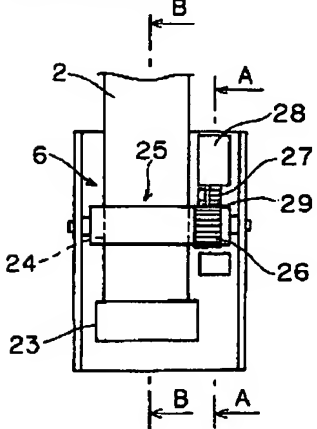
[Drawing 4]



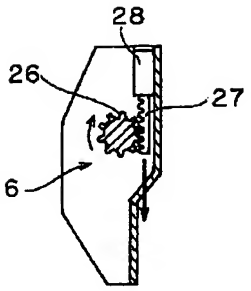
[Drawing 5]



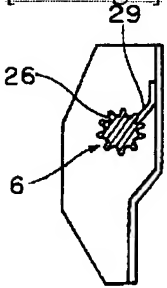
[Drawing 6]



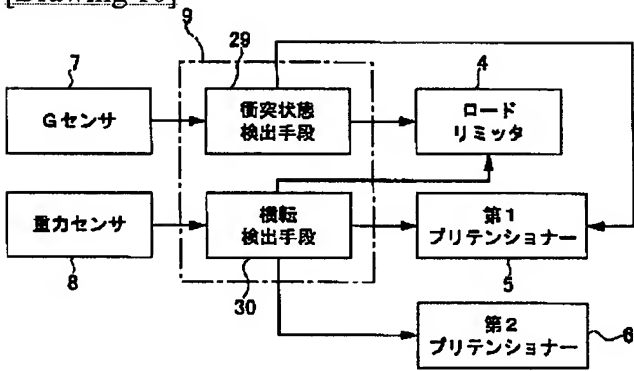
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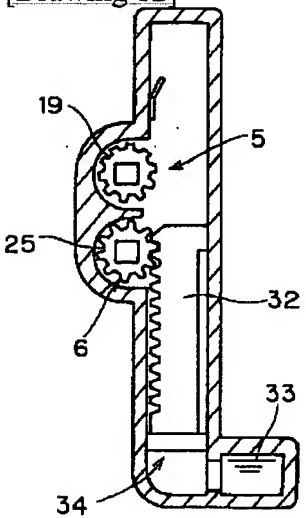
[Drawing 9]



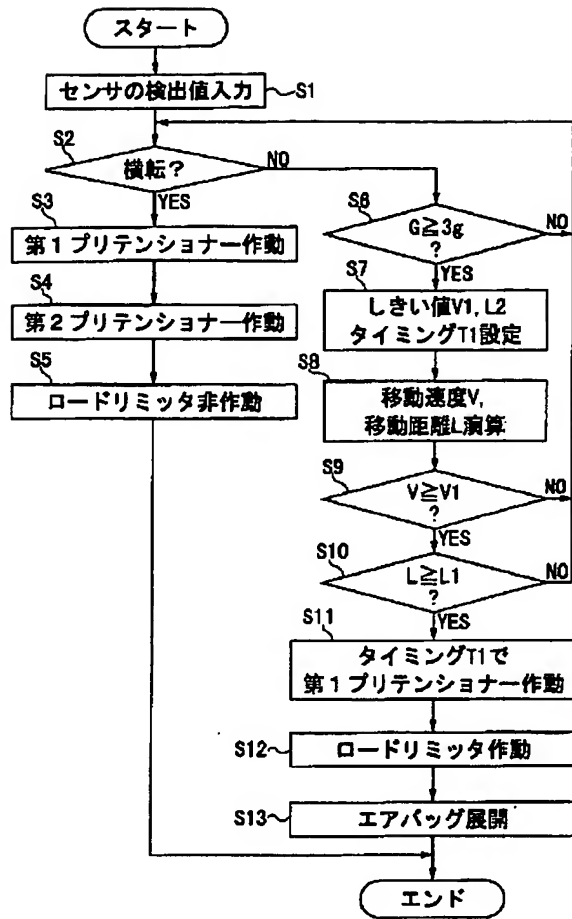
[Drawing 10]



[Drawing 12]



[Drawing 11]



[Translation done.]